

DEVICE FOR LEADING AND HOLDING ELECTRICAL LINES IN A SWIVEL
REGION OF DOORS

5

Cross-Reference to Related Application:

This application is a continuation, under 35 U.S.C. § 120, of
copending international application No. PCT/EP02/10210, filed
September 11, 2002, which designated the United States; this
10 application also claims the priority, under 35 U.S.C. § 119,
of German patent application No. 101 47 764.3, filed September
27, 2001; the prior applications are herewith incorporated by
reference in their entirety.

15 Background of the Invention:

Field of the Invention:

The invention relates to a device for leading and holding
electrical lines in the swivel region of doors.

20 German Published, Non-Prosecuted Patent Application DE 39 17
201 describes a device for leading and holding electrical
lines in the swivel region of doors and the like,
particularly, folding doors of dishwashing machines, by an
insulating retainer in which the lines are placed. This
25 device has two half-shells that are joined together into which
the cable harnesses or cable straps are placed and held there

by friction. To protect the cable portion that is exposed to bending from breakage or damage, a fish plate that expands in flat fashion is disposed at each of the half-shell regions, which provides for an optimally small bending radius and
5 protects the insulation of the electrical lines.

The problem of long-term bending loads or alternating bending loads on electrical lines, which may lead to a cable break or material degradation of the insulating layer, is managed, at
10 least for a longer period, by the device according to German Published, Non-Prosecuted Patent Application DE 39 17 201. However, notwithstanding the ability to achieve a certain protection for the electrical lines by the device according to this reference, a significant residual risk remains that
15 electrical lines that are exposed to a regular alternating load will sustain damage.

Summary of the Invention:

It is accordingly an object of the invention to provide a
20 device for leading and holding electrical lines in the swivel region of doors that overcomes the hereinafore-mentioned disadvantages of the heretofore-known devices of this general type and that also guarantees reliable protection against breakage of the cable or the insulation layer in electrical
25 lines that are disposed in the swivel region of doors.

With the foregoing and other objects in view, there is provided, in accordance with the invention, a device for leading and holding electrical lines in a swivel region of doors, including first and second tubular portions each having
5 a respective sleeve region with a cylindrical cross-section and shaped in the form of a crank, the sleeve regions being joined together to rotate against one another.

With the objects of the invention in view, there is also
10 provided a device for leading and holding electrical lines in a swivel region of doors, including first and second tubular portions each having a respective sleeve region with a cylindrical cross-section and shaped in the form of a crank, the sleeve regions being joined together rotatably and
15 rotating with respect to one another.

In the inventive device for leading and holding electrical lines in the swivel region of doors, first and second tubular portions are provided with a cranked sleeve region with a
20 substantially cylindrical cross-section. The two sleeve regions are joined together such that each is rotatable against the other.

The advantage of the inventive device is that the electrical
25 lines that are led therethrough are not exposed to any bending load or alternating bending load; rather, they are subjected

only to a torsion load over a defined longitudinal section of the electrical lines. Such torsion load has the advantage that it exerts no pulling and pushing stress on the smallest line portions, which could produce microtears that could lead
5 to the total loss of the electrical lines given permanent loading.

In accordance with another feature of the invention, the sleeve region of the second portion is inserted into the
10 sleeve region of the first portion so that the sleeve region of the first portion surrounds that of the second portion, forming a joint like a plain bearing.

In accordance with a further feature of the invention, it is
15 particularly advantageous to install the device such that the axis of rotation running through the sleeve regions of the inventive device coincides with the pivot axis formed by the doors.

20 In accordance with an added feature of the invention, to avoid sharp edges or projections that could promote damage to the electrical lines, a step is provided within the interior of the sleeve region of the first portion, by which step the lead-through region for the electrical lines is kept
25 substantially free of changes in diameter.

In accordance with an additional feature of the invention, there are provided fastening elements, advantageously, at one or both portions of the inventive device, which allow fastening to household appliances such as dishwashers, washing
5 machines, stoves, or the like.

In accordance with yet another feature of the invention, the first and second portions are household appliance door swivel devices for fastening in a household appliance, in particular,
10 dishwashers or washing machines.

In accordance with yet a further feature of the invention, the first and second portions are shell-shaped components.

15 For assembly and furnishing purposes, the inventive device is, advantageously, produced from a thermoplastic and formed from individual shells along a suitable dividing line so that at least a substantial part of the inventive device is divisible and the furnishing of electrical lines can take place without
20 a problem.

The individual shells of the inventive device are joined by an integral hinge such that the excess film region does not represent an obstacle to the serviceability of the joint
25 region of the two sleeve regions, which is in the form of a plain bearing.

For securing the position of the two sleeve regions, the regions are provided with elements that prevent an axial shifting of the sleeve regions. For example, such securing
5 can be realized by a semicircular bead and collar configuration, the bead and collar being disposed on the first and second sleeve regions, respectively.

In accordance with yet an added feature of the invention,
10 there are provided elements preventing axial shifting of the sleeve region of the first portion disposed at the sleeve region of the second portion.

In accordance with yet an additional feature of the invention,
15 there is provided at least one axial stopping element disposed at the sleeve region of the second portion and preventing an axial shift of the sleeve region of the first portion.

In accordance with a concomitant feature of the invention,
20 there are provided elements preventing axial shifting of the sleeve region of the second portion disposed at the sleeve region of the first portion.

Other features that are considered as characteristic for the
25 invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in a device for leading and holding electrical lines in the swivel region of doors, it is, nevertheless, not intended to be limited to the details shown because various
5 modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention,
10 however, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

15 Brief Description of the Drawings:

FIG. 1 is a fragmentary, cross-sectional view a device according to the invention for leading and holding electrical lines in the swivel region of doors; and

20 FIG. 2 is a perspective view of the device of FIG. 1.

Description of the Preferred Embodiments:

Referring now to the figures of the drawings in detail and first, particularly to FIG. 1 thereof, there is shown a first
25 tubular portion 1 with a sleeve region 3 having a substantially cylindrical cross-section that is cranked

upward, whereas the second tubular portion 2, which has a sleeve region 4 with a substantially cylindrical cross-section that is cranked downward, is inserted into the sleeve region 3 of the first portion 1. Stop elements 5 are provided at the
5 second portion 2 to prevent further insertion of the second portion 2 into the sleeve region 3 of the first portion 1 so that, when the sleeve region 4 is inserted into the sleeve region 3, the tongue-shaped end 7 of the sleeve region 3 penetrates the stop element 5 of the sleeve region 4 so that
10 the two portions 1 and 2 are joined by friction in a substantially permanent fashion. To make the joint between the first and second portions 1, 2 still more stable, for instance, in household appliances such as dishwashers that are subject to their own motion, it is expedient to dispose lock
15 noses at the tongue-shaped ends 7 of the sleeve 3, which, in connection with corresponding stop elements 5, produce a joint that is positive as well as non-positive and, thus, prevent the joint between the first and second portions 1, 2 from coming undone of its own accord. The inventive device is,
20 advantageously, installed such that the axis of rotation running through the sleeve regions 3, 4 of the inventive device coincides with the swivel axis formed by the doors.

FIG. 2 is a perspective representation of the inventive device
25 with a second portion 2 that is configured for cable straps,

which run through the central sleeve region and exit the inventive device in individualized form.